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Acidity Determinations on Malayan Soils.

A Preliminary Note.

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Recent work(1) on hydrogen ion determinations in soils has shown that considerable discrepancies exist between such determinations on suspensions and on clear extracts; in spite of this the use of colorimetric methods on extracts continues, and authors frequently omit to mention whether suspensions or extracts were used in their work.

Many 'acid' Malayan soils (acid judging by lime requirement determined by the usual methods) show discrepancies between the pH values of suspensions and those of clear extracts far exceeding those previously recorded and often amounting to pH 2-3. The suspensions (1 : 1 or 1 : 3, quinhydrone or hydrogen electrode) are as a rule pH 4.1—5.0 while the dialysed, settled, or filtered extracts of similar concentrations are pH 6.2—7.4 with Clark-Lubs indicators.

In the case of one soil under investigation the soil solution, displaced by the Parker(2) method, had a pH value equal to that of the 1 : 1 filtered extracts, viz 7.4, while the suspension showed 4.15 pH.

It has been found that similar discrepancies exist between the pH of suspensions of gelatinous iron and aluminium hydroxides to which small quantities of acid have been added(3), and the filtrates from such suspensions. The possibility at once presents itself that the large observed discrepancies are due to the presence of such hydroxides and not merely or solely to the paucity of soluble matter in our highly leached soils.

1 Barnette, Hissink and van der Spek. Actes de la IVme. Conf. Intern. de. Pédologie II p. 453.

2 Parker—Soil Science XII p. 209.

3 For the adsorption of ions by ferric hydroxide, v. the work of Sen abstracted in Brit. Chem. Abst. 1927 p 509.

Barnette and his co-workers take the view that their results show that the pH values of extracts should be disregarded, the present writer however submits that the matter may not be so simple and that these values may be of physiological importance. If the hydrogen ions present cannot influence an exceedingly delicate indicator when separated by a relatively coarse grained filter paper, can it be assumed without further work that they can influence the protoplasm of plants through very fine textured cell walls?

Further work is in progress, but this is bound to be lengthy, and the object of this note is to suggest that workers in other tropical countries should ascertain whether similar discrepancies exist and should invariably record their method of determining pH values.

Longevity of Hevea Brasiliensis.

(Yields of Rubber from some of the Oldest Estates in Malaya.)

F. G. Spring.

Introduction.

A preliminary report on longevity of *Hevea brasiliensis* appeared in the Malayan Agricultural Journal Vol. XIV, No. 1, January, 1926, page 18. In that article it was stated that "The results, up to date, indicate that when depreciating yields per acre are found, the true câuse lies not in the age of the trees but in bad environmental conditions brought about by a number of causes such as soil erosion, severity and quality of tapping, bad soil moisture conditions, impoverished soils and disease."

Experimental.

In 1925, the writer visited numerous old estates with a view to selecting a few on which to conduct an experiment to determine the yield of rubber per acre, per annum, obtainable from "average" trees on the estates selected. After consultation with the Plant Physiologist it was agreed that the yield of rubber should be taken from three test plots each of ten trees on each estate. All the groups of trees were selected by the writer and every precaution was taken to obtain as far as possible trees of which the characteristics were "average" for the particular estate. Diseased trees, abnormally high or low yielders, abnormally well developed or poorly developed trees were excluded. The test plots were some distance apart but never exceeded half a mile between the 1st and 3rd groups. Areas exhibiting abnormal conditions in respect of soil, drainage, lie of land or type of tree were not included in the experimental plots. The system of tapping, height of cut from the ground and quality of tapping of the plots on any one estate were as far as possible similar.

The trees and collecting pails of each plot were distinctively marked to facilitate supervision and to reduce the probability of mistakes in the field.

The trees were tapped according to the particular estate system and one day each month the Manager arranged for the collection of latex from the test plots separately, the Asiatic staff being unaware of the day of collections, this precaution was taken to obtain an average standard of tapping. Generally one coolie tapped all the trees in plots A, B & C but where that was not done, the coolies were changed

over periodically. The latex from plots A, B & C was coagulated separately and the coagulum machined to fine crepe and subsequently dried. When thoroughly dry the weights were recorded by the Manager. The writer visited the estates and obtained check yields which confirmed those recorded by the Managers.

The tests were conducted on eleven estates and, on six of those properties the yields were obtained, one day each month, over a period of one year; on the other properties, the records are of shorter duration. The estimated yields are calculated on 160 tapping days annually and the stand of trees, per acre, of the particular plot. The yield is estimated from each group of the trees separately and not the average of the three groups consisting of thirty trees. A survey was made by the writer of each area where the experiment was carried out and full particulars are given in this article. The writer is not in a position to guarantee the estate records made but as they correspond, on the whole, with the check yields it is reasonable to assume that the returns are within the limits of experimental error. The writer is indebted to the estate Managers for the care, interest shown and personal supervision given in the carrying out of the experiments.

Summary of Yields from Test Plots.

Estate.	Age of Trees.	Estimated yield per acre, per annum.	No. of Trees per acre.	Lie of Land.	Soil.
	Years				
A	39	Plot A = 474 lbs.	77	Undulating.	Lateritic clay.
		„ B = 549 „	77		
		„ C = 519 „	77		
B	31	„ A = 313 „	51	Hilly. The land has suffered extensively from surface erosion.	Lateritic clay.
		„ B = 381 „	58		
		„ C = 375 „	74		
C	25	„ A = 324 „	55	Hilly. The land has suffered from surface erosion.	Light sandy clay.
		„ B = 384 „	64		
		„ C = 358 „	56		
D	28	„ A = 775 „	57	Flat. Excellent drainage.	Heavy clay.
		„ B = 509 „	52		
		„ C = 800 „	64		
E	29	„ A = 384 „	40	Flat. No drainage.	Sandy loam.
		„ B = 340 „	40		
		„ C = 548 „	40		
F	24	„ A = 651 „	74	Flat.	Light sandy clay.
		„ B = 621 „	74		
		„ C = 488 „	74		
G	30	„ A = 540 „	60	Hilly and subject to wash.	Sandy clay.
		„ B = 462 „	60		
		„ C = 378 „	60		
H	27	„ A = 454 „	64	Flat. Poor drainage.	Impervious clay and soil water logged.
		„ B = 348 „	52		
		„ C = 396 „	63		
I	28	„ A = 633 „	66	Very gently undulating.	Light sandy clay.
		„ B = 514 „	66		
		„ C = 349 „	66		
J	22	„ A = 300 „	64	Flat.	Light sandy clay deficient in humus.
		„ B = 711 „	56		
		„ C = 305 „	65		
K	28	„ A = 1024 „	64	Flat coastal type. Good drainage system.	Heavy clay. Formerly some peat which has become incorporated in the clay.
		„ B = 1036 „	74		
		„ C = 1240 „	62		

Discussion.

The results generally are not in accordance with a comment made in the Straits Times, Saturday, January 9th, 1926 "That a considerable proportion of the rubber in Malaya is now past its prime, which we should put at from 12 to 15 years. Bark renewal will not be as good . . . ."

Where exceptionally bad environmental conditions exist, trees may give depreciating yields when around 12 to 15 years of age but this is only what one might reasonably expect and cannot be attributed to the age of the trees. Nearly all the oldest estates have suffered from bad environmental conditions, some very much more than others and this is due to the lack of knowledge in the pioneer planting days. In the early days of rubber planting some of the limiting factors underlying production which received little attention were, quality and severity of tapping, soil erosion, surface moisture conditions and drainage, stand of trees per acre, thinning out according to selection and retention of high yielders, impoverished soils, cover crops and disease. In the development of an entirely new industry one cannot expect it to be worked on correct lines which are so essential if the life and vitality of the trees are to be maintained over a long period of years. There is no doubt that our old trees have suffered very considerably from incorrect treatment yet it is surprising how trees around 30 years of age continue, in many instances, to give satisfactory returns. The oldest trees included in the test were 39 years old when records were first made and these trees are now yielding around 500 lbs. of dry rubber, per acre annually.

There is not the slightest doubt that the yields recorded from the selected trees could have been obtained over the whole areas under observation had the trees not suffered, especially in the early days, from what, in the light of present day experience, can be called severe maltreatment. The discrepancies between the yields, per acre, calculated from the test plots and the actual yields (when available) from the entire fields can be attributed almost entirely to the presence in these old areas of large numbers of poorly developed or injured trees, which were excluded from the test plots. The writer's object was not to ascertain the commercial life of a few existing old areas—but to arrive at some idea of the profitable life of Hevea if well-treated.

There are many of our old trees which have suffered so severely from bad treatment and environmental conditions that they are no longer a paying proposition with rubber around 1/6 a lb. and a replanting programme should be considered. This, however, cannot be accepted as a reason for believing that age is the limiting factor underlying production. It is unfortunate that the adherence to principles of planting which cause depreciating yields in later life have been continued so long.

It is probable that many of our old estates which are giving depreciating returns could be improved as regards yield but it is not possible to say on what lines without a thorough and intimate knowledge of a particular estate. It is hard to determine how long the profitably commercial life of an average old estate may continue to be but there does not appear to be any cause for alarm provided that the present vitality of the tree is fairly good and precautions taken to improve environmental conditions where necessary. The writer is optimistic as regards a longer life for our younger generation of trees growing under better conditions and suitable treatment.

Reference to the tables will show that the highest yield was obtained from Estate K. where the yield may be estimated at around 1,000 lbs. to the acre, annually. The trees were planted in 1898 in flat coastal land; the soil being a heavy clay. An excellent deep drainage system was put in during 1906 but previous to this the drains were superficial. The system of tapping conducted is the A. B. C. alternate day V tapping on half the circumference of the tree. The next best results are from Estate D. The trees on Estate D were also planted in the year 1898 on flat coastal clay land and a deep drianage system was constructed seven years ago but previous to this the drainage was poor. The system of tapping is a quarter cut, alternate day; it might here be mentioned that the trees were rested from April, 1923, to April, 1924. Satisfactory returns were recorded from Estate F where the land is flat and the soil a light sandy clay. There was no drainage system previous to May, 1925, when drains were made in every 4th row of trees. Next in yield to those obtained from well drained flat areas come the undulating areas more especially where there has been little soil erosion. Although the highest returns come from the well drained flat areas this is no proof that the undulating land would not have given equally good results had they never been subject to soil erosion. It is noticeable that the poorest yields come from hill land which has suffered extensively from soil wash and flat water-logged land badly drained.

ESTATE A.

Date of Visit. 12th November, 1925.

Age of trees. 39 years.

Lie of land. Undulating.

Soils. Lateritic clay.

History of area previous to rubber planting. Coffee cultivation.

History of area from planting up to date. Clean Weeded. Coffee growing as a catch crop for several years in rubber areas.

Present condition of trees. Branching at medium height. The trees have been very severely wounded in past years and they practically all show burrs. The foliage is not very good. Very thin bark and poor renewal. This rubber is not in good condition.

No. of trees originally planted per acre. 108 (20′ x 20′).

Present No. of Trees per acre. 77.

Thinning out. From time to time.

Past Yields.

	1924	1923	1922	1921	1920
Yield per acre lbs.	283	205	223	218	341
	1919	1918	1917	1916	1915
Yield per acre lbs.	344	239	363	365	349

System of tapping. Ladder tapping originally. A few years on two quarter cuts daily tapping up to 1920. February, 1921, single quarter cut alternate day.

Present system of tapping. Single quarter cut, alternate daily 22″ from ground.

Resting. Nil.

Bark Consumption. $\frac{3}{4}$ of an inch per month.

No. of trees tapped per coolie. 450.

Drainage. Nil.

Bark. Renewed is bad, being thin and slightly dry. The tapping of former years was not only very severe but also very bad. In some instances tapping was conducted up to a height of 20 feet. Burrs most prevalent. Cortex red in colour.

Latex Vessels. 12, taken at a height of 1 foot from ground from 7 years renewal.

Yields of Dry Rubber.

Date of Tapping	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
3rd December, 1925 ...	6.55 ozs	6.20 ozs.	2.65 ozs.	Recorded
9th January, 1926 ...	5.20 „	11.25 „	8.45 „	by Estate
6th February, 1926 ...	9.75 „	8.40 „	9.60 „	Manager.
28th March, 1926 ...	5.75 „	5.10 „	9.75 „	
3rd April, 1926 ...	5.70 „	8.25 „	7.40 „	
29th May, 1926 ...	7.15 „	5.95 „	7.50 „	
15th June, 1926 ...	6.68 „	7.52 „	7.56 „	
July, 1926 ...	5.65 „	7.45 „	7.65 „	
August, 1926 ...	4.25 „	7.15 „	4.30 „	
September, 1926 ...	5.70 „	7.80 „	4.10 „	
October, 1926 ...	5.35 „	4.10 „	6.80 „	
November, 1926 ...	6.25 „	6.55 „	5.30 „	
Totals ...	73.98 „	85.72 „	81.06 „	
Averages ...	6.16 „	7.14 „	6.75 „	
28th July, 1926 ...	3.6 „	2.42 „	5.82 „	Recorded by Department of Agriculture.

Girth measurements taken at a height of 3 feet from the ground on 12th November, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 5′ $8\frac{1}{2}$″	Girth 5′ 0″	Girth 4′ 3″
„ 2	„ 5′ 4″	„ 4′ 10″	„ 3′ 0″
„ 3	„ 3′ 10″	„ 4′ 5″	„ 5′ 4″
„ 4	„ 5′ 6″	„ 4′ 4″	„ 3′ 3″
„ 5	„ 5′ 2″	„ 4′ 5″	„ 6′ 2″
„ 6	„ 5′ 3″	„ 4′ 7′	„ 3′ 9″
„ 7	„ 5′ 4″	„ 4′ 3″	„ 4′ 7″
„ 8	„ 7′ 9″	„ 5′ 8″	„ 5′ 3″
„ 9	„ 4′ 5″	„ 4′ 0″	„ 5′ 0″
„ 10	„ 5′ 6″	„ 3′ 10″	„ 3′ 11″

ESTATE B.

Date of Visit. 13th November, 1925.

Age of Trees. 31 years.

Lie of Land. Hilly and subject to wash. Roots exposed by wash.

Soil. Lateritic clay.

History of area previous to rubber planting. Coffee cultivation.

History of area from time of planting up to date. Clean weeded. In 1906 the rubber was under grass and blukar for about one year. Now it is difficult to get grass to grow on account of impoverished soil conditions due to soil erosion.

Present condition of trees. Growth of stems and branches, medium. Foliage medium. Branching high.

No. of Trees originally planted per acre. 193 (15′ by 15′). Present No. of Trees per acre plot A = 51, Plot B =58 and Plot C=74.

Past Yields.

Years.	System of Tapping.	Acreage.	Trees per acre.	Yield per acre.	Remarks.
1919	Single cut quarter daily -	40.50	86	274 lbs.	
1920	do	„	86	232 „	
1921	V cut on half cir. alternate daily -	„	86	160 „	Tapped for 8 months of the year only.
1922	Single cut on quarter alternate daily -	„	86	238 „	
1923	do	„	85	233 „	
1924	do	„	85	214 „	

System of tapping. Severe tapping in former years and excessive high rate of bark consumption. Since February, 1921—¼ cut alternate day, previous tapping V alternate day for 6 months, previous to this ¼ cut daily tapping for several years.

Resting. Six months in 1921.

Thinning out during. 1914.

Bark consumption. 1 inch per month.

Present system of tapping. Single ¼ cut alternate day.

No. of Trees tapped per coolie. 450.

Drainage. Nil.

Brown Bast and Burrs. Small percentage of trees.

Bark. Poor renewal and thin bark but not very dry bark.

Latex Vessels. 18, taken at a height of 1 ft. from the ground from 7 years bark renewal.

Yields of Dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
December, 1925 ...	6.15 ozs.	3.15 ozs.	2.90 ozs.	Recorded by Estate Manager.
January, 1926 ...	7.50 ,,	6.85 ,,	2.75 ,,	
25th January, 1926 ...	6.40 ,,	5.70 ,,	4.40 ,,	
12th February, 1926 ...	5.50 ,,	5.50 ,,	5.10 ,,	
10th March, 1926 ...	3.25 ,,	3.20 ,,	3.80 ,,	
7th April, 1926 ...	5.66 ,,	11.33 ,,	6.66 ,,	
May, 1926 ...	6.33 ,,	10.33 ,,	6.33 ,,	
16th June, 1926 ...	9. ,,	7.33 ,,	6.66 ,,	
15th July, 1926 ...	4.66 ,,	7.66 ,,	6.66 ,,	
10th September, 1926...	6. ,,	6. ,,	7. ,,	
7th October, 1926 ...	7. ,,	6. ,,	5.33 ,,	
12th November, 1926 ...	6.33 ,,	6. ,,	5. ,,	
Total ...	73.78 ,,	79.05 ,,	62.59 ,,	
Averages ...	6.14 ,,	6.58 ,,	5.21 ,,	
28th July, 1926 ...	7. ,,	7.03 ,,	8.07 ,,	Recorded by Department of Agriculture.

Girth measurements taken at a height of 3 feet from the ground on 13th November, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 5′ 0″	Girth 4′ 9″	Girth 4′ 6½″
,, 2	,, 3′ 10″	,, 5′ 2″	,, 5′ 6½″
,, 3	,, 4′ 7″	,, 4′ 9½″	,, 5′ 6″
,, 4	,, 7′ 0″	,, 5′ 0″	,, 6′ 4″
,, 5	,, 8′ 6″	,, 4′ 4½″	,, 4′ 10″
,, 6	,, 4′ 6″	,, 5′ 3½″	,, 4′ 0″
,, 7	,, 5′ 5″	,, 5′ 3½″	,, 4′ 1½″
,, 8	,, 5′ 11″	,, 6′ 5½″	,, 4′ 2″
,, 9	,, 5′ 8″	,, 5′ 6½″	,, 4′ 0″
,, 10	,, 5′ 0″	,, 6′ 8″	,, 5′ 9″

ESTATE C.

Date of Visit. 6th. November, 1925.

Age of trees. 25 years.

Lie of Land. Hilly.

Soil. Light sandy clay.

History of area previous to rubber planting. Jungle.

History of area from time of planting up to date. Clean weeding.

Present condition of trees. Average height, 60 ft. to 80 ft. Very tall trees with very high branching. Good foliage with dark green colour. Well grown tap roots and good laterals. Condition of bark satisfactory. Severely wounded in the past but owing to three years recent rest the wounds are scarcely noticeable. Bark reserve is ample. Thick bark renewal and not dry or brittle. Good tapping.

No. of Trees originally planted per acre. 170 (16′ by 16′ planting).

Present No. of Trees per acre. Plot A=55, Plot B= 64 and Plot C = 56.

Past Yields. Tapping in these two fields was resumed in March, 1923, after a resting period of nearly three years. The Manager was not in a position to give the exact figures for yields, per acre, in the past, but he considered that it would have been in the neighbourhood of 260—270 lbs. with tapping on quarter cut alternate days.

System of tapping. The original tapping was severe and conducted up to a height of 7 feet.

Bark consumption. $\frac{3}{4}$ of an inch per month, alternate day tapping.

No. of trees tapped per coolie. 350.

Drainage. Several years ago catch pits were made but there is no evidence of them now. No. drainage system at present and much damage has been done by soil erosion.

Brown Bast. Very little brown bast or burrs.

Resting Period. From 1st February, 1920 to 31st December, 1922.

Thinning out. Approximately 50 per cent of the trees were thinned out in 1920.

Present system of tapping. $\frac{1}{4}$ cut, alternate day.

Bark. Bark renewal is satisfactory, being thick and not dry or brittle. Wounds very well healed over. Cortex red in colour.

Yields of Dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
November, 1925 ...	4 ozs.	10 ozs.	9 ozs.	Recorded by Estate Manager.
December, 1925 ...	5½ „	6 „	5 „	
January, 1926 ...	8 „	4 „	8 „	
February, 1926 ...	5½ „	5 „	3½ „	
April, 1926 ...	6½ „	6 „	7½ „	
May, 1926 ...	3¼ „	9½ „	6¼ „	
July, 1926 ...	5¾ „	4¼ „	5 „	
August, 1926 ...	4½ „	5 „	4½ „	
September, 1926 ...	6 „	3¾ „	7½ „	
October, 1926 ...	6¾ „	6¼ „	9¼ „	
November, 1926 ...	6¼ „	5¾ „	6¾ „	
December, 1926 ...	9 „	6½ „	10¼ „	
Totals ...	71 „	72 „	77½ „	
Averages ...	5.9 „	6.0 „	6.4 „	
June, 1926. ...	6½ „	9½ „	6 „	Recorded by Department of Agriculture.
June, 1926. ...	5 „	4 „	7 „	do

Girth measurements taken at a height of 3 feet from the ground on 6th November, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 5′ 0″	Girth 5′ 1″	Girth 5′ 5″
„ 2	„ 4′ 5″	„ 5′ 7″	„ 4′ 5″
„ 3	„ 5′ 0″	„ 4′ 10″	„ 6′ 7″
„ 4	„ 4′ 0″	„ 5′ 1″	„ 5′ 6″
„ 5	„ 5′ 5″	„ 4′ 7″	„ 4′ 11″
„ 6	„ 4′ 5″	„ 5′ 7″	„ 4′ 6″
„ 7	„ 3′ 10″	„ 3′ 11″	„ 4′ 9″
„ 8	„ 4′ 8″	„ 4′ 0″	„ 4′ 5″
„ 9	„ 5′ 6″	„ 5′ 0″	„ 5′ 9″
„ 10	„ 6′ 4″	„ 4′ 9″	„ 4′ 9″

ESTATE D.

Date of Visit. 5th January, 1926.

Age of Trees. 28 years.

Lie of Land. Flat.

Type of Soil. Clay.

History of area previous to rubber planting. Jungle.

History of area from time of planting up to date. Clean weeded up to 4 years ago when Centrosema Plumieri was planted as a cover crop and has been grown even since.

Present condition of trees. Branching, high. Poor tap roots but lage lateral root development. Thick bark and good renewal. Bark not dry or brittle.

No. of Trees originally planted per acre. (10′ by 10′) = 435.

Present No. of Trees per acre. Plot A =57, Plot B = 52 and Plot C = 64.

Past Yields.

1916—1917	=	386 lbs.	per acre.
1917—1918	=	518 ,,	,,
1918—1919	=	374 ,,	,,
1919—1920	=	396 ,,	,,
1920—1921	=	338 ,,	,,
1921—1922	=	327 ,,	,,
1922—1923	=	368 ,,	,,
1923—1924	=	Rested	

Present system of tapping. ¼ cut alternate day since April, 1923. Cut opened up at 30″ from the ground.

Past Tapping. Prior to 1915, not less than 3 cuts on ¼ cut, alternate day. Ladder tapping in early days. May, 1915, 2 cuts, ¼ alternate day. October, 1915, daily tapping lower cut only. Remained on daily tapping ¼ cut from 1915 to April 1923.

Rested. April, 1923 to April, 1924.

Thinning out. Over a period of 11 years but not during the past two years.

No. of trees tapped per coolie. 300.

Bark consumption. 8 inches per annum.

Drainage. A proper system of drainage was put in 7 years ago but before this the drainage was exceptionally poor.

Water table 8 years ago. 12″ to 18″.

Water table now. 3′ to 4′.

No. of latex rings in 7 years bark renewal measured 1 foot from ground. 19.

Burred trees. Many cut out.

YIELDS OF DRY RUBBER.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
15th December, 1925 ...	11 ozs.	5 ozs.	11 ozs.	Recorded by Estate Manager.
February, 1926 ...	12 „	8 „	13 „	
March, 1926 ...	12 „	7 „	9 „	
April, 1926 ...	11 „	8 „	10 „	
May, 1926 ...	16 „	11 „	12 „	
June, 1926 ...	19 „	10 „	12 „	
July, 1926 ...	19 „	7 „	15 „	
August, 1926 ...	15 „	12 „	16 „	
September, 1926 ...	12 „	12 „	14 „	
October, 1926 ...	14 „	14 „	15 „	
November, 1926 ...	9 „	9 „	11 „	
December, 1926 ...	14 „	15 „	13 „	
Totals ...	164 „	118 „	151 „	
Averages ...	13.6 „	9.8 „	12.5 „	
24th. February, 1926 ...	11.8 „	6.3 „	11.9 „	Recorded by Department of Agriculture.

GIRTH MEASUREMENTS TAKEN AT A HEIGHT OF 3 FEET FROM THE GROUND ON 5TH JANUARY, 1926.

	Plot A.	*Plot B.*	*Plot C.*
Trees No. 1	Girth 5′ 6″	Girth 3′ 9″	Girth 4′ 7″
„ 2	„ 5′ 3″	„ 4′ 11″	„ 6′ 5″
„ 3	„ 5′ 4″	„ 4′ 8″	„ 5′ 8″
„ 4	„ 6′ 9″	„ 4′ 2″	„ 4′ 1″
„ 5	„ 6′ 10″	„ 5′ 0″	„ 6′ 3″
„ 6	„ 4′ 6″	„ 4′ 9″	„ 5′ 6″
„ 7	„ 4′ 6″	„ 5′ 4″	„ 6′ 9″
„ 8	„ 6′ 3″	„ 5′ 1″	„ 4′ 8″
„ 9	„ 4′ 6″	„ 4′ 2″	„ 4′ 3″
„ 10	„ 5′ 3″	„ 4′ 5″	„ 4′ 5″

ESTATE E.

Date of Visit. 2nd December, 1925.

Age of Trees. 29 years.

Lie of Land. Flat.

Soil. Sandy Loam.

History of area previous to rubber. Coffee cultivation.

History of area from time of rubber planting to date. Coffee cut out in 1905. Always clean weeded.

Present condition of trees. Well grown trunks but high branching. Good leaf development and large lateral root development. Bark in good condition

Original No. of Trees per acre. 150.

Present No. of Trees per acre. 40.

Drainage. Nil.

Brown Bast. There were many trees infected with brown bast (and burred trees) but these were cut out when thinning out.

No. of Trees tapped per coolie. 300.

Bark consumption. 1″ per month.

Yields. Calculated, per acre, per annum.

July, 1925, works out at crop of 463 lbs. per acre.

August, 1925, works out at crop of 421 lbs. per acre.

September, 1925, works out at crop of 531 lbs. per acre.

October, 1925, works out at crop of 500 lbs. per acre.

Thinning out. Thinning out during 1922, previous thinning out in 1918.

Present system of tapping. V alternate day.

Past system of tapping. Severe tapping in past years, numerous systems adopted until more conservative systems were used. October, 1924, commenced alternate day tapping.

Bark. The bark has been severely wounded in former years but owing to the excellent renewal, the bark is now in good condition. It is not dry or brittle.

Latex Vessels. 25 taken at height of 1 foot from ground, 7 years bark renewal.

Yields of Dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
3rd December, 1925 ...	10.1 ozs.	5.5 ozs.	13.5 ozs.	Recorded by Estate Manager.
18th January, 1926 ...	11.5 „	5.75 „	15.5 „	
26th March, 1926 ...	7.75 „	6.5 „	12.5 „	
29th April, 1926 ...	9.5 „	5.5 „	10.5 „	
14th June, 1926 ...	10.0 „	6.5 „	12.5 „	
14th July, 1926 ...	11.25 „	8.5 „	9.5 „	
19th August, 1926 ...	9.5 „	10.5 „	13.0 „	
10th September, 1926...	8.5 „	10.5 „	14.5 „	
12th October, 1926 ...	9.0 „	11.0 „	14.5 „	
12th November, 1926...	10.5 „	11.0 „	16.25 „	
17th December, 1926 ...	10.25 „	12.5 „	16.5 „	
11th January, 1927 ...	8.5 „	8.25 „	16.5 „	
Totals ...	116.35 „	102.0 „	165.25 „	
Averages ...	9.6 „	8.5 „	13.7 „	
22nd February, 1926 ...	7.3 „	6.0 „	9.0 „	Recorded by Department of Agriculture.
30th June, 1926 ...	11.5 „	10.0 „	14.0 „	do

Girth measurements taken at a height of 3 feet from the ground on 2nd December, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 5′ 6″	Girth 5′ 3½″	Girth 6′ 2″
„ 2	„ 5′ 0″	„ 5′ 5″	„ 4′ 11″
„ 3	„ 4′ 5″	„ 5′ 0″	„ 4′ 7″
„ 4	„ 5′ 4″	„ 7′ 0″	„ 5′ 1″
„ 5	„ 4′ 9″	„ 4′ 4″	„ 4′ 4″
„ 6	„ 3′ 10″	„ 5′ 3″	„ 5′ 1″
„ 7	„ 5′ 5″	„ 5′ 2″	„ 7′ 11″
„ 8	„ 6′ 0″	„ 4′ 11″	„ 5′ 1″
„ 9	„ 5′ 0″	„ 4′ 10½″	„ 5′ 10″
„ 10	„ 4′ 3″	„ 4′ 0″	„ 4′ 3″

ESTATE F.

Date of Visit. 15th, October, 1925.

Date of Planting 1902. Area 34¼ acres.

Lie of Land. Flat.

Soil. Light sandy clay.

History of area previous to rubber planting. Virgin Jungle.

History of area from time of planting up to date. Coffee planted first and rubber interplanted later. Coffee cut out in 1911. Estate continuously maintained clean weeded.

Present condition of trees. Average height 50 to 60 feet. Branching high. Good root system. Well developed tap roots and good lateral root system. Thin bark but wounds well healed over. Trees have not been badly tapped in former years.

No. of trees originally planted per acre. 150.

Present No. of trees per acre. 74.

Past Yields.

1917, dry weight of rubber 581.43 lbs. per acre.

1918, dry weight of rubber 421.69 lbs. per acre.

1919, dry weight of rubber 476.43 lbs. per acre.

Rested 1st January, 1920, to 31st December, 1921.

1922, dry weight of rubber 412.70 lbs. per acre. November and December not full out.

1923, dry weight of rubber 406.4 lbs. per acre. No. of tapping days = 159.

1924, dry weight of rubber 222.89 lbs. per acre. Nine months tapping. 116 tapping days.

Rested from 30th September, 1924 to 1st July,1925.

System of tapping. Tapped on full herring bone with 4 to 5 cuts on each side, alternate day tapping, subsequently ladder tapping up to lower branches. Followed by two Vs, lower V 27 inches from ground and other V, 2 feet above the lower V. Later tapping single V at 36 inches from ground, continuous alternate day tapping. 1st April, 1917 turned over from 2 Vs. to one V. First January, 1922, Single V. 36 inches from ground, alternate day tapping.

Tapping during 1918, V

,, ,, 1919, V

,, ,, 1920, rested.

,, ,, 1921, ,,

,, ,, 1922, Nov. & Dec. restricted crop.

Drainage. Drains put in every 4th row of trees in May, 1925 but no drainage scheme previous to this.

Age of Trees. 24 years.

Brown Bast. Very little.

Burrs. Very few.

Bark. Thin but wounds well healed over. Cortex red in colour. Bark rather dry and brittle.

Note.—At the time of my visit (15.10.25) the system of tapping of the experimental plots was a single V, opened up on 1st July, 1925 at 18 inches and its position now is about 15 inches from the ground. Tapping on 3rd renewal of bark. Approximate number of cuts to the inch 20. No. of trees tapped per coolie = 315.

Yields of Dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
7th November, 1925 ...	8.65 ozs.	6.90 ozs.	4.85 ozs.	Recorded by Estate Manager.
11th December, 1925 ...	8.10 „	7.10 „	5.50 „	
8th January, 1926 ...	7.90 „	6.50 „	6.25 „	
11th February, 1926 ...	11.00 „	7.00 „	6.65 „	
3rd March, 1926 ...	9.00 „	5.00 „	5.85 „	
6th November, 1926 ...	8.50 „	18.25 „	11.00 „	
Totals ...	53.15 „	50.75 „	40.10 „	
Averages ...	8.8 „	8.4 „	6.6 „	
29th December, 1925 ...	6.8 8	5.10 „	4.80 „	Recorded by Department of Agriculture.
29th June, 1926 ...	10.3 „	8.4 „	9.5 „	do

Girth measurements taken at a height of 3 feet from the ground on 15th October, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 4′ 7″	Girth 4′ 10″	Girth 4′ 2″
„ 2	„ 5′ 0″	„ 4′ 1″	„ 4′ 11″
„ 3	„ 4′ 3″	„ 2′ 11″	„ 4′ 6″
„ 4	„ 4′ 1″	„ 7′ 1″	„ 4′ 9″
„ 5	„ 6′ 3″	„ 4′ 0″	„ 3′ 6″
„ 6	„ 3′ 10″	„ 5′ 10″	„ 4′ 5″
„ 7	„ 4′ 8″	„ 2′ 6″	„ 5′ 4″
„ 8	„ 3′ 11″	„ 4′ 0″	„ 4′ 8″
„ 9	„ 3′ 5″	„ 4′ 11″	„ 4′ 7″
„ 10	„ 5′ 3″	„ 5′ 7″	„ 3′ 11″

ESTATE G.

Date of Visit. 13th November, 1925.

Age of Trees. 30 years.

Lie of Land. Hilly, subject to wash.

Soil. Sandy Clay.

History of area previous to rubber. Coffee cultivation.

History of area from time of rubber planting up to date. Clean weeded.

Present condition of trees. High branches. Poor foliage. The trees have been severely injured in former years by bad tapping. Thin bark and poor renewal. This rubber is not in good condition. The trees have suffered from impoverished soil conditions due to soil erosion.

No. of Trees originally planted per acre. 193 (15′ by 15′).

Present No. of Trees per acre. 60.

No. of Trees tapped per coolie. 400.

Bark consumption. $\frac{3}{4}$ of an inch per month.

Yield. Calculated from 15th July to 30th October, 1925,—384 lbs. per acre, per annum over the whole estate. The youngest rubber is six years old.

Thinning out. Previous to 1919.

Resting. About 3 years. Commenced tapping again on 15th July, 1925.

System of tapping. From 1922 onwards $\frac{1}{4}$ cut, alternate day, cut at 22″ from ground. 1910 to 1922 = $\frac{1}{4}$ cut daily. Original tapping very severe; several cuts on full herring bone daily tapping.

Bark. Excessive high rate of bark consumption in early years of tapping. Bark very thin, dry and hard.

Drainage. Nil.

Latex Vessels. 7, taken at a height of 1 foot from the ground, 7 years bark renewal.

Yields of dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
November, 1925 ...	11 ozs.	8 ozs.	$7\frac{1}{2}$ ozs.	Recorded by Estate Manager.
December, 1925 ...	$6\frac{1}{2}$ „	$7\frac{1}{4}$ „	5 „	
January, 1926 ...	5 „	$6\frac{1}{4}$ „	$4\frac{3}{4}$ „	
February, 1926 ...	11 „	$7\frac{1}{2}$ „	$4\frac{1}{2}$ „	
March, 1926 ...	$10\frac{1}{2}$ „	$9\frac{1}{2}$ „	$9\frac{1}{4}$ „	
April, 1926 ...	12 „	9 „	$5\frac{1}{2}$ „	
July, 1926 ...	$7\frac{1}{2}$ „	$6\frac{3}{4}$ „	$7\frac{3}{4}$ „	
Totals ...	$63\frac{1}{2}$ „	$54\frac{1}{4}$ „	$44\frac{1}{4}$ „	
Averages ...	9.0 „	7.7 „	6.3 „	
July, 1926 ...	$6\frac{1}{2}$ „	$7\frac{1}{2}$ „	8 „	Recorded by Department of Agriculture.

Girth measurements taken at a height of 3 feet from the ground on 13th November, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 6′ $7\frac{1}{2}$″	Girth 3′ 10″	Girth 4′ 6″
„ 2	„ 3′ 8″	„ 6′ $8\frac{1}{2}$″	„ 4′ 5″
„ 3	„ 4′ $10\frac{1}{2}$″	„ 5′ 0″	„ 3′ 1″
„ 4	„ 6′ $10\frac{1}{2}$″	„ 4′ 6″	„ 6′ 3″
„ 5	„ 5′ 7″	„ 3′ 9″	„ 5′ 10″
„ 6	„ 6′ 11″	„ 3′ $9\frac{1}{2}$″	„ 3′ $9\frac{1}{2}$″
„ 7	„ 4′ $10\frac{1}{2}$″	„ 5′ $9\frac{1}{2}$″	„ 6′ $5\frac{1}{2}$″
„ 8	„ 4′ 0″	„ 6′ 10″	„ 4′ 7″
„ 9	„ 5′ 11″	„ 7′ 10″	„ 7′ $6\frac{1}{2}$″
„ 10	„ 6′ 4″	„ 5′ 1″	„ 4′ $11\frac{1}{2}$″

ESTATE H.

Date of Visit. 3rd March, 1926.

Age of Trees. 27 years.

Lie of Land. Flat.

Type of Soil. Heavy Clay.

History of area previous to rubber planting. Coffee.

History of area from time of planting rubber. Clean weeding.

No. of Trees originally planted per acre. 10′ x 10′, giving 435. The planting was not strictly 10′ x 10′ but mostly irregular.

Present No. of trees per acre. Plot A = 64, Plot B = 52 and Plot C = 63.

Drainage. Poor.

Growth of Trees. Irregular.

Brown Bast and Burrs. Prevalent.

Past tapping systems. Past 5 years on alternate day tapping and not more than one cut during the past five years. Six years ago, 2 cuts on half herring bone, daily tapping.

Present system of tapping. ¼ cut, alternate day.

Bark consumption. 6″ per year.

No. of trees tapped per coolie. 300.

Latex Vessels. 10, taken at a height of 1 foot from the ground on 7 year's bark renewal.

Yields of dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
April, 1926 ...	4½ ozs.	7½ ozs.	7 ozs.	Recorded by Estate Manager.
June, 1926 ...	6½ „	7 „	5¼ „	
July, 1926 ...	7¼ „	6½ „	7 „	
August, 1926 ...	5½ „	5½ „	6½ „	
September, 1926 ...	8½ „	5 „	7 „	
October, 1926 ...	12 „	7 „	3¾ „	
November, 1926 ...	5 „	6½ „	6 „	
December, 1926 ...	7¾ „	8¾ „	8 „	
Totals ...	57 „	53¾ „	50½ „	
Averages ...	7·1 „	6·7 „	6·3 „	

Girth measurements taken at a height of 3 feet from the ground on 3rd March, 1926.

	Plot A.	*Plot B.*	*Plot C.*
Tree No. 1	Girth 5′ 6″	Girth 6′ 2½″	Girth 7′ 1½″
„ 2	„ 3′ 9″	„ 4′ 8″	„ 4′ 4½″
„ 3	„ 4′ 8″	„ 5′ 5″	„ 5′ 2″
„ 4	„ 3′ 10″	„ 6′ 6″	„ 5′ 6″
„ 5	„ 7′ 5½″	„ 6′ 7½″	„ 6′ 2½″
„ 6	„ 4′ 4″	„ 5′ 4″	„ 6′ 3″
„ 7	„ 4′ 5½″	„ 3′ 11″	„ 6′ 1″
„ 8	„ 5′ 0″	„ 5′ 1″	„ 7′ 1½″
„ 9	„ 6′ 4″	„ 6′ 1″	„ 3′ 6″
„ 10	„ 5′ ½″	„ 4′ 3″	„ 5′ 7″

ESTATE I.

Date of Visit. 19th October, 1925.

Age of Trees. 28 years.

Lie of Land. Very gently undulating, slight mounds.

Soil. Light sandy clay.

History of area previous to rubber planting. Coffee cultivation.

History of area from time of rubber planting up to date. Rubber interplanted with Coffee in 1898. Always clean weeded. Limed in 1912.

Present condition of trees. Average height 50 to 60 feet. Branching at medium height. Well developed tap root and good lateral root system. Bark mostly thin but some trees show thick bark. Wounds well healed over. Considering the age of the trees, the tapping has been exceptionally good.

No. of trees originally planted per acre. 108. (20 by 20 feet).

Present No. of trees per acre. 66.

Past yields.

1920, average yield over 787¾ acres—339.27 lbs. per acre.

1921, average yield over whole estate 337.21 lbs. per acre.

Tapping daily single quarter cut.

1922, average yield over whole estate 410 lbs. per acre.

1923, average yield over whole estate 485 lbs. per acre

1924, average yield over whole estate 543 lbs. per acre.

Tapping 1922, 1923, and 1924 same as 1921.

Note.—It should be mentioned that the yields given are from areas varying in age from six years up to 27 years.

System of Tapping. Previous to 1912, tapping up to a height of seven feet. In 1912, 4 cuts on quarter, heighest cut about 4 feet from ground. This system was maintained until 1915, when 2 quarter cuts (superimposed) 18 inches and 18 inches was the system. Up to this time, daily tapping.

In 1918, adopted one quarter cut 33 inches from the ground, daily tapping changed over to V alternate day tapping in 1920 and in November, started a single quarter cut 33 inches from ground, alternate day which is the present system.

Bark consumption. One inch per month.

No. of trees tapped per coolie. 375.

Drainage. Nil.

Brown Bast. There was a good deal of brown bast and burred trees but these were removed when thinning out.

Present system of tapping. One quarter cut, alternate day.

Bark. Thin but wounds well healed over. A few trees have moderately thick bark.

Cortex red in colour. Bark inclined to be very slightly dry and brittle.

Yields of dry Rubber.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
4th November, 1925 ...	10 ozs.	8 ozs.	3 ozs.	Recorded
4th December, 1925 ...	9 ,,	14 ,,	7 ,,	by Estate
5th January, 1926 ...	9 ,,	11 ,,	3 ,,	Manager.
5th February, 1926 ...	9 ,,	6 ,,	5 ,,	
5th March, 1926 ...	6 ,,	4 ,,	3 ,,	
5th April, 1926 ...	11 ,,	9 ,,	5 ,,	
5th May, 1926 ...	11 ,,	7 ,,	7 ,,	
5th June, 1926 ..	9 ,,	6 ,,	6 ,,	
5th July, 1926 ...	11 ,,	6 ,,	6 ,,	
5th August, 1926 ...	14 ,,	10 ,,	7 ,,	
5th September, 1926 ...	11 ,,	7 ,,	6 ,,	
8th November, 1926 ...	6 ,,	6 ,,	6 ,,	
Totals ...	116 ,,	94 ,,	64 ,,	
Averages ...	9.6 ,,	7.8 ,,	5.3 ,,	
10th May, 1926 ...	6.5 ,,	5.4 ,,	6.0 ,,	Recorded by
21st October, 1926 ...	6.8 ,,	5.2 ,,	2.6 ,,	Department of
18th December, 1926 ...	7.2 ,,	7.2 ,,	6.7 ,,	Agriculture.

Girth measurements taken at a height of 3 feet from the ground on 19th October, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Trees No. 1	Girth 4′ 5″	Girth 6′ 2″	Girth 4′ 5″
,, 2	,, 5′ 10″	4′ 5″	4′ 1″
,, 3	,, 4′ 7″	7′ 4″	5′ 6″
,, 4	,, 7′ 0″	4′ 6″	5′ 4″
,, 5	,, 5′ 1″	5′ 2″	4′ 5″
,, 6	,, 6′ 2″	5′ 1″	5′ 2″
,, 7	,, 5′ 1″	8′ 2″	3′ 10″
,, 8	,, 5′ 9″	3′ 4″	4′ 1″
,, 9	,, 4′ 5″	4′ 5″	4′ 10″
,, 10	,, 6′ 2″	5′ 4″	4′ 11″

ESTATE J.

Date of Visit. 5th November, 1925.

Age of Trees. 22 years.

Lie of Land. Flat.

Soil. Light sandy clay, deficient in humus.

History of area previous to rubber planting. Coffee Estate.

History of area from time of rubber planting up to date. Clean weeded.

Present condition of trees. Poor. Height about 50 feet. Poor branching and poor foliage but a moderately good root system. I attribute the poor growth and appearance of the trees to impoverished soil conditions. Trees severely tapped in former years.

No. of Trees originally planted per acre. 222 (14′ by 14′ planting).

Present No. of trees per acre. Plot A = 64, Plot B = 56 and Plot C = 65.

Past Yields.

1910—1916. 350 to 400 lbs. per acre.
1917—1921. 300 to 325 lbs. per acre.
1922—1925. Rested.

Present Yield. Trees reopened on half V at 39 inches, July, 1925. Daily tapping. Results September and October 1925, 475 lbs. per acre.

System of tapping. Original tapping, herring bone and ladder, followed by less severe daily tapping.

Alternate day tapping started in 1914, 2 superimposed cuts on ½ circumference, the top cut was discontinued in 1920. Rested from October 1921, to June 1925. July 1925, reopened single V on ½ circumference at 39″, daily tapping.

Changed to alternate day, December, 1925.

Bark consumption. 1½ inch per month, daily tapping.

No. of trees tapped per coolie. 325.

Brown Bast and Burrs. Prevalent in the past but most of the diseased trees have been cut out during thinning out. At present possibly 5% of the trees are attacked.

Bark. Bark renewal is most variable, a few trees have good renewal but on the whole the renewed bark is extremely thin.

YIELDS OF DRY RUBBER.

Date of Tapping.	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
April, 1926 ...	2.5 ozs.	9.5 ozs	2.5 ozs	Recorded by Estate Manager.
June, 1926 ...	5.7 ,,	13.2 ,,	5.7 ,,	
July, 1926 ...	5.4 ,,	13.0 ,,	4.4 ,,	
August, 1926 ...	5.6 ,,	12.8 ,,	5.1 ,,	
September, 1926 ...	5.6 ,,	13.0 ,,	5.1 ,,	
October, 1926 ...	3.7 ,,	14.8 ,,	5.6 ,,	
Totals ...	28.5 ,,	76.3 ,,	28.4 ,,	
Averages ...	4.7 ,,	12.7 ,,	4.7 ,,	
May, 1926 ...	3.8 ,,	14.1 ,,	6.2 ,,	Recorded by Department of Agriculture.

GIRTH MEASUREMENTS TAKEN AT A HEIGHT OF 3 FEET FROM THE GROUND ON 5TH NOVEMBER, 1925.

	Plot A.	*Plot B.*	*Plot. C.*
Trees No. 1	Girth 4′ 1″	Girth 5′ 5″	Girth 4′ 2″
,, 2	,, 5′ 0″	,, 4′ 5″	,, 3′ 6″
,, 3	,, 3′ 9″	,, 5′ 0″	,, 4′ 0″
,, 4	,, 3′ 5″	,, 4′ 5″	,, 4′ 7″
,, 5	,, 3′ 9″	,, 5′ 0″	,, 5′ 2″
,, 6	,, 4′ 4″	,, 4′ 8″	,, 3′ 4″
,, 7	,, 5′ 7″	,, 4′ 11″	,, 3′ 5″
,, 8	,, 4′ 1″	,, 5′ 1″	,, 4′ 8″
,, 9	,, 2′ 9″	,, 5′ 0″	,, 4′ 4″
,, 10	,, 4′ 1″	,, 6′ 1″	,, 4′ 4″

ESTATE K.

Date of Visit. 21st October, 1925.

Age of Trees. 28 years.

Lie of Land. Flat, coastal type.

Soil. Heavy clay. Originally a peat top layer but the peat has now become incorporated in the clay.

History of area previous to rubber planting. Coffee cultivation.

History of area from time of rubber planting to date. Coffee was grown as a catch crop amongst the rubber for about ten years. Always clean weeded.

Present condition of trees. Average height 50 to 60 feet. Very fine trunk growth. Root system, large lateral development but poor tap roots on account of high water table. Superficial root system. Few roots exposed. Very good bark renewal. Few wounds and well healed over. Tapping of a high standard, both past and present.

No. of trees originally planted per acre about 350. Irregular planting. Property opened up by a Chinese owner.

Present No. of trees per acre. Plot A=64, Plot B=74 and Plot C = 62. No thinning out during the past two years.

Past Yields. 367 lbs. per acre for eight months tapping, 1st January to 31st August, 1925. (A.B.C. ten months tapping and 5 months rest, V. alternate day tapping). This yield is equivalent to approximately 550 lbs. per acre. One area 48 acres (not experimental area) gave 690.5 lbs. per acre, alternate day tapping, in the year 1924. Age of trees 22 years. Another area of 144 acres, 22 years old rubber, (not experimental area) tapped for the same period but on alternate A.B.C. system gave 427.2 lbs. per acre.

System of tapping. Ladder tapping originally; followed by herring-bone with either 4 or 3 cuts; followed by two quarter cuts, alternate day tapping. Changed to V in beginning of 1918, still alternate day tapping. In February, 1923, started A.B.C. system, V at 30″ from ground, alternate day tapping. Field A. rested for 2 years and three months from 1st November, 1920 to 31st January, 1923. Present system of tapping. A.B.C. alternate day tapping, V cut at 30″ from ground.

Bark consumption. 8½ inches a year on A.B.C. system.

No. of trees tapped per coolie. 281.

Drainage. Good drainage system put in during 1906, previous to this the drains were very superficial.

Brown Bast. Few cases.

Burred Trees. Few.

Bark. Bark in execellent condition. No appearance of hard dry brittle bark. Quality of tapping very good and all wounds well healed over. At present tapping on fourth renewal. Cortex red in colour.

The Manager informed the writer that there is no evidence of a falling off in yield of the 27 year old trees.

Latex Vessels. 25, taken from virgin bark at a height of 6′ 6″ from ground. The No. of latex vessels on six years renewal bark = 20.

YIELDS OF DRY RUBBER.

Date of Tapping	*Plot A.*	*Plot B.*	*Plot C.*	*Remarks.*
27th November, 1925...	12 ozs.	12 ozs.	16 ozs.	Normal sunny day.
14th December, 1925...	20 ,,	12 ,,	21 ,,	Cloudy day.
31st January, 1927 ...	15 ,,	18 ,,	24 ,,	Rested since Dec. 1925, until 1st July, 1926.
28th February, 1927 ...	20 ,,	17 ,,	24 ,,	
15th March, 1927 ...	16 ,,	11 ,,	16 ,,	
Totals ...	83 ,,	70 ,,	101 ,,	
Averages ...	16 ,,	14 ,,	20 ,,	

GIRTH MEASUREMENTS TAKEN AT A HEIGHT OF 3 FEET FROM THE GROUND ON 21ST OCTOBER, 1925.

	Plot A.	*Plot B.*	*Plot C.*
Trees No. 1	Girth 6′ 1″	Girth 3′ 6″	Girth 6′ 10″
,, 2	,, 6′ 4″	,, 4′ 6″	,, 6′ 4″
,, 3	,, 5′ 4″	,, 3′ 10″	,, 5′ 5″
,, 4	,, 3′ 6″	,, 7′ 0″	,, 5′ 7″
,, 5	,, 5′ 10″	,, 5′ 6″	,, 6′ 2″
,, 6	,, 3′ 10″	,, 5′ 0″	,, 7′ 10″
,, 7	,, 6′ 10″	,, 5′ 11″	,, 5′ 2″
,, 8	,, 4′ 8″	,, 5′ 3″	,, 4′ 2″
,, 9	,, 5′ 7″	,, 7′ 6″	,, 4′ 8″
,, 10	,, 3′ 10″	,, 5′ 1″	,, 3′ 10″

Publications of the Department of Agriculture.

The following publications, except those out of print, may be obtained on application to the Office of the Secretary for Agriculture; and the Malay States Information Agency, 88, Cannon Street, E.C. London.

A remittance to cover the cost should accompany applications; otherwise the Journals will be sent by post, Cash on Delivery, where that system is in force.

1. The Agricultural Bulletin F.M.S.

Vols. I—IV (1913-16) VIII & IX (1920-21) price $5.00 per volume.
Vol. V (1917) Nos. 1, 2, 3, 5 & 6 ,, 2.50 per set.
Vol. VII (1919) ,, 2—6 ,, 4.50 per set.

(Vol. VI is out of print.)

2. The Malayan Agricultural Journal (continuing the Agricultural Bulletin) Published monthly.

Vol. X (1922) Price $5.00 per volume.
Vol. XI (1923) Price $5.00 per volume or 50 cents per single number.
Vol. XII (1924) ,, ,, ,, ,, ,,

Back numbers of Vols. I.—X will not be sold singly.

3. The Handbook of Malayan Agriculture, price $1.00.

Current numbers of the Malayan Agricultural Journal and the Handbook may be purchased from the Railway Bookstalls and Branches of Messrs. The Federal Rubber Stamp Co

4. *Special Bulletins.*

1. Notes on *Termes Gestroi* and other species of Termites found on Rubber Estates in the Federated Malay States, by H. C. Pratt, 1909, 20 cts.
2. Root Disease of *Hevea Brasiliensis*, by W. J. Gallagher. C
3. Observations on *Termes Gestroi* as affecting the Para Rubber Tree and methods to be employed against its Ravages, by H. C. Pratt, 1910, 20 cts.
4. *Brachartona catoxantha, Hamps*, by H. C. Pratt, 1909. C
5. The Extermination of Rats in Rice Fields, by W. J. Gallagher, 1909. C
6. Branch and Stem Disease of *Hevea Brasiliensis*, by W. J. Gallagher, 1909. C
7. Coffea Robusta, by W. J. Gallagher, Government Mycologist, 1910, 20 cts.
8. The Cultivation and Care of the Para Rubber Tree (in Malay) 1910. C
9. Die-Back Fungus of Para Rubber and of Cacao, by K. Bancroft, 1911. C
10. A Lecture on the Para Rubber Tree, by W. J. Gallagher 1910. C
11. Coconut Cultivation, by L. C. Brown, 1911 C
12. Padi Cultivation in Krian, by H. C. Pratt, 1911. C
13. A Root Disease of Para Rubber, *Fomes Semitostus*. by K. Bancroft. 1912, 20 cts.

C = Cancelled

Fig. 1.—Four-months Old Seedlings in Nursery Beds.

Fig. 2.—Nine-months Old Seedlings in Nursery Beds.